

What is claimed is:

1. A CMOS image sensor comprising:

an image capturer for capturing an image and producing  
5 an analog image signal from an object;

an analog-to-digital converter for converting the analog  
image signal to a digital value using a ramp signal, wherein  
the analog-to-digital converter includes:

- a) a chopper-type comparator receiving the analog  
10 image signal and the ramp signal; and
- b) a capacitor for receiving a start voltage of the  
ramp signal and charging a voltage level  
corresponding the start voltage of the ramp signal  
in a reset mode and for receiving a down-ramping  
15 signal of the ramp signal in a count mode in order  
to remove a device offset voltage; and

a ramp signal generator providing the ramp signal to the  
analog-to-digital converter.

20 2. The CMOS image sensor as recited in claim 1,  
wherein the capacitor is a first capacitor and wherein the  
chopper-type comparator comprises:

a plurality of capacitors and switches; and

at least two inverting amplifiers, wherein the switches  
25 are controlled by a digital controller in the CMOS image  
sensor.

3. The CMOS image sensor as recited in claim 1,  
further comprising a latch circuit for storing the digital  
value converted by the analog-to-digital converter, wherein  
the latch circuit has a plurality of buffer lines to store  
5 the digital value only.

4. The CMOS image sensor as recited in claim 2,  
wherein the chopper-type comparator comprises:  
a first switch connected to the image capturer;  
10 a second switch connected to the ramp signal generator;  
a second capacitor connected to the first switch,  
wherein the first capacitor is connected between the first  
switch and the second switch;  
a first inverting amplifier connected to the second  
15 capacitor;  
a third switch connected between input and output  
terminals of the first inverting amplifier;  
a third capacitor connected to the first inverting  
amplifier;  
20 a fourth switch connected between input and output  
terminals of the second inverting amplifier; and  
a second inverting amplifier connected to the third  
capacitor and the latch circuit to store the digital value.

5. The CMOS image sensor as recited in claim 4,  
wherein the first switch is turned on in response to a  
control signal from the digital controller in the rest mode

and in a charge transfer mode in which photocharges are transferred to the analog-to-digital converter.

6. The CMOS image sensor as recited in claim 5,  
5 wherein the first third and fourth switches are turned on in response to a control signal from the digital controller in the charge transfer mode in which photocharges are transferred to the analog-to-digital converter.

10 7. A method for removing a device offset voltage in a CMOS image sensor, the method comprising:  
charging a start voltage of a ramp signal in a capacitor and simultaneously charging a rest voltage of an image capturer in a chopper-type comparator in a reset mode;  
15 providing to the chopper-type comparator an analog image signal from the image capturer in a charge transfer mode; and  
providing a down-ramping signal of the ramp signal to the chopper-type comparator in a count mode.